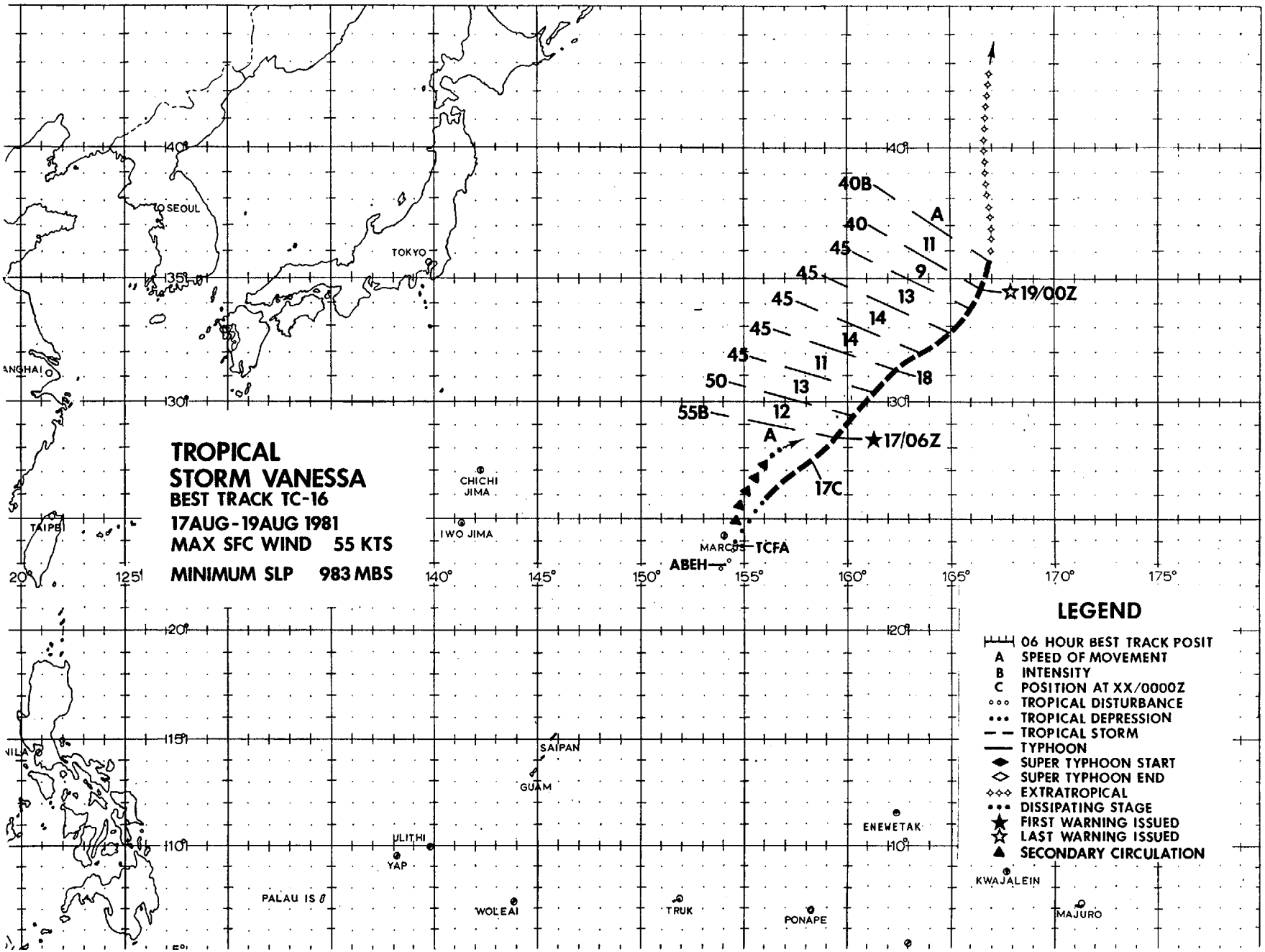
TROPICAL
STORM VANESSA
BEST TRACK TC-16
17AUG-19AUG 1981
MAX SFC WIND 55 KTS
MINIMUM SLP 983 MBS
40B
40
45
45
45
45
50
55B
A
11
9
13
14
14
11
13
12
18
19/00Z
17/06Z
17C
TCFA
ABEH
MARC
SEOUL
TOKYO
ANGHAI
TAIPE
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
ENEWETAK
KWAJALEIN
MAJURO
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SECONDARY CIRCULATION

Tropical Storm Vanessa developed approximately 60 nm (111 km) south of Marcus Island (WMO #47991) during a period of enhanced convective activity within the monsoon trough. Despite diurnal fluctuations, the increased convective activity was evident on the satellite imagery of 12 August and continued to increase over the next several days. Furthermore, surface synoptic data and satellite data confirmed the merger of the monsoon trough with a pre-existing north-south oriented trough near 170E that had been in evidence since 7 August. This second trough was particularly intense due to prior passage of Tropical Storm Susan (14). Weak circulations and minor disturbances were detected along the entire length of the merged troughs and investigative missions were flown to several of them. The first disturbance to intensify significantly produced Typhoon Thad (15), while 18 hours later (170600Z) the first warning was issued on Tropical Storm Vanessa (Fig. 3-16-1).

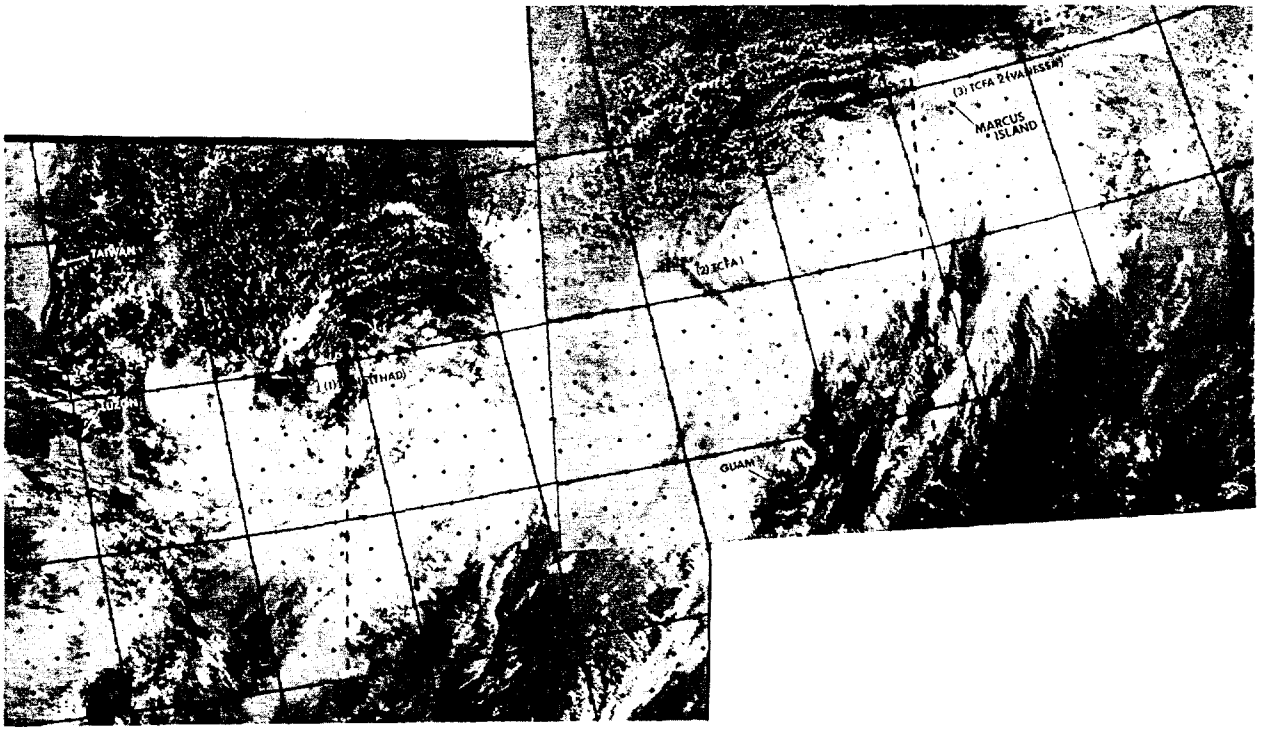

FIGURE 3-16-1a: Active monsoon trough as it appeared prior to development of Tropical Storm Vanessa. (1) TD-15(Thad), (2) initial TCFA and (3) area where TD-16(Vanessa) developed. Photo is mosaic using consecutive NOAA 6 passes for 152131Z and 152312Z, Aug 1981. (NOAA 6 visual imagery)

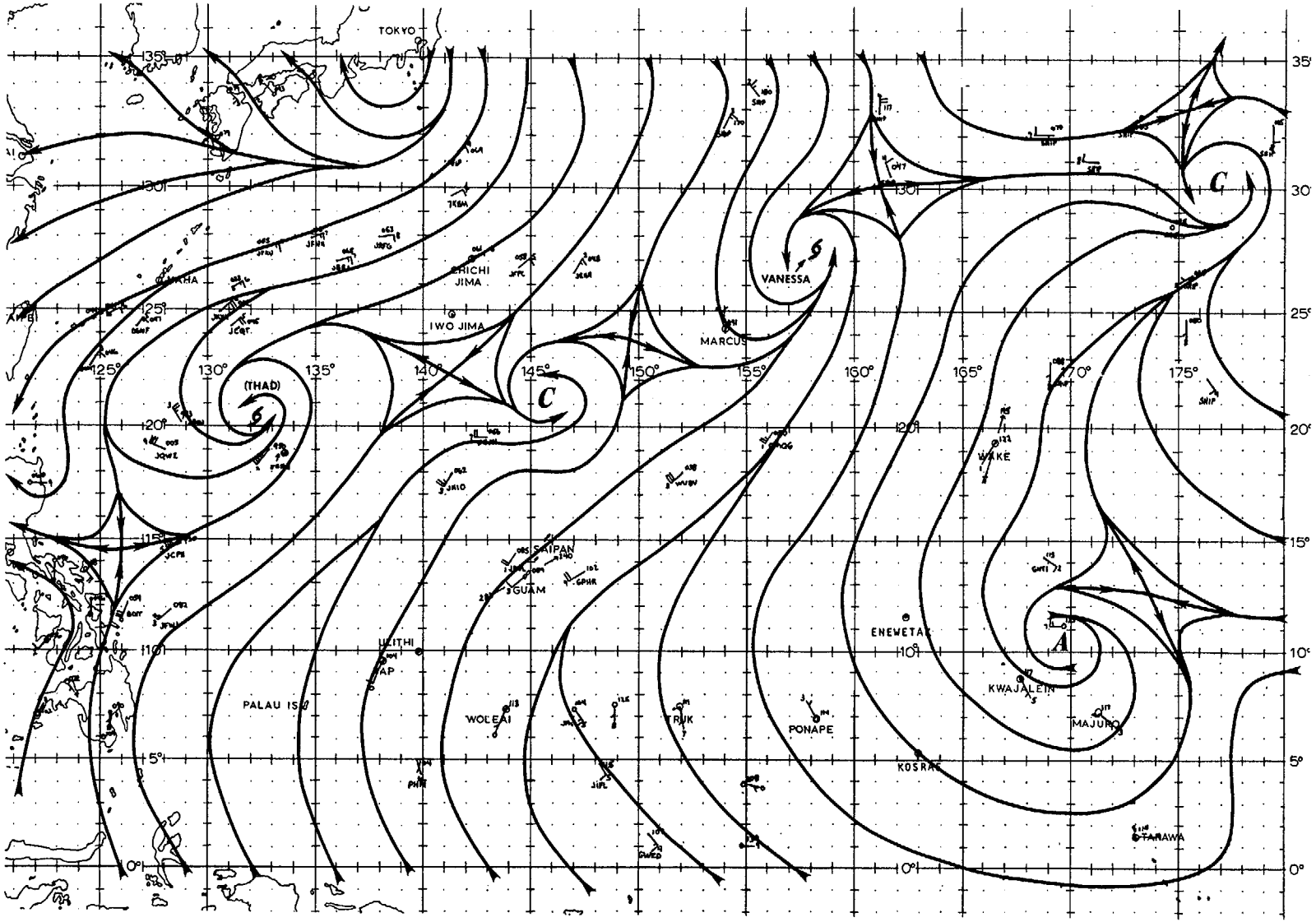

FIGURE 3-16-1b: The 170000Z, Aug 1981 surface (⟵)/gradient-level (ddd ⟵ ff) wind data and streamline analysis depicting the monsoon trough. Wind speeds are in knots.

An initial Tropical Cyclone Formation Alert (TCFA) was issued at 150525Z for a circulation near 20N 149E which, in the ensuing 24 hours, weakened. This TCFA was superseded by a second TCFA at 160617Z for a circulation near 24N 155E. Re-analysis of all available satellite data for the period shows that the circulations were separate entities and were related only because they developed within the same trough. Furthermore, re-analysis also reveals that there was a primary and a secondary circulation present when the second TCFA was issued. The primary circulation was totally obscured by dense overcast and was not initially apparent. Initial satellite fixes were based on the partially exposed secondary circulation. In actuality, the primary circulation was located approximately 60 nm (111 km) to the south of the satellite fixes (Fig. 3-16-2). The troublesome secondary circulation was no longer discernible after approximately 12 hours and satellite analysts were able to locate the primary circulation.

Enhanced convection and the intense trough were the key low level features contributing to the genesis of Vanessa. Two other contributory features were a mid-tropospheric trough and an upper level anticyclone, both of which were in positions favorable for tropical cyclone development.

The mid-tropospheric trough approximated the position of the surface trough. Several circulations were embedded within this trough, including one over the surface position where Vanessa formed. In the upper troposphere, an anticyclone had existed over the area since 15 August. Vanessa, therefore, possessed the vertical alignment of a mature tropical cyclone from her inception. (Similar conditions existed during the formation of Tropical Storm Phyllis (12)).

It is interesting to note that although Vanessa was vertically aligned, little further development took place after Vanessa was completely free of the surface trough. Two factors probably contributed to non-development:

a. Initially, Vanessa had outflow to the southwest and the northeast. The wind currents exiting the Asian landmass split with the major current being diverted north of the ridge while the weaker current passed south. This weaker southern current was not sufficiently strong enough to maintain the northeast outflow channel and no other outlets were available to connect Vanessa to the westerlies. Thus, only southwest outflow was maintained.

b. In addition to the loss of an outflow channel, Vanessa's northeastward progression was blocked by strong ridging associated with a large 500 mb anticyclone over the Marshall Islands. The ridge forced Vanessa to steer due north. Since Vanessa initially formed at a rather high latitude subsequent northward movement brought her rapidly into contact with upper level shearing currents.

By 190000Z, Vanessa was devoid of convection and the extratropical transition was completed. The completely exposed low level circulation continued to be visible on the satellite imagery for sometime as it continued to track north and eventually merged with a mid-latitude system near 40N 165E. It was finally no longer discernible as a separate entity by 210000Z.

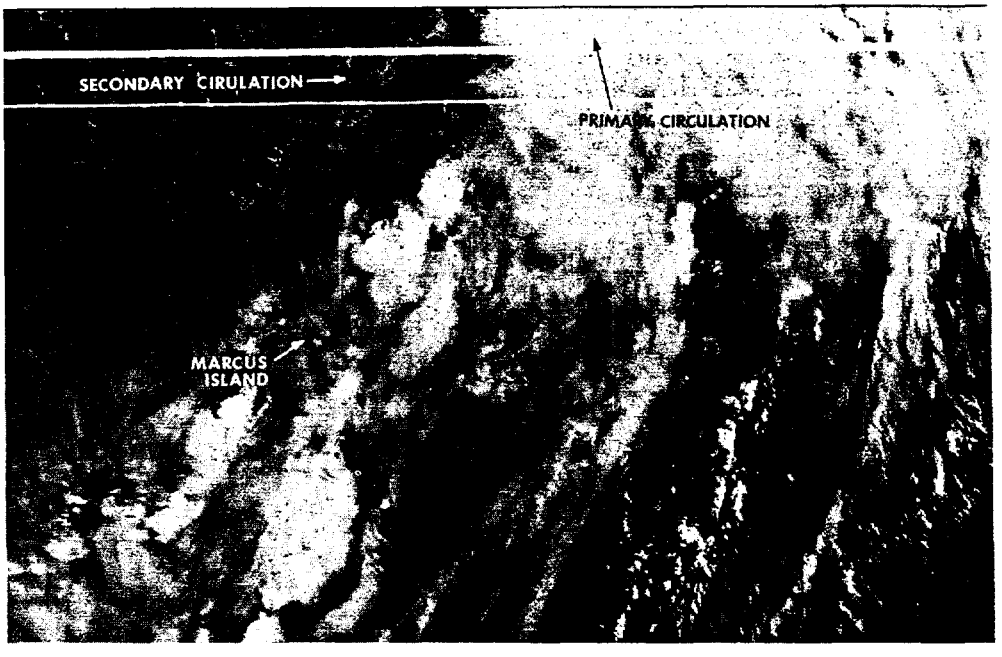

FIGURE 3-16-2. Satellite imagery for 162108Z, Aug 81 showing the exposed secondary circulation and the convective area associated with the developing TD-16(Vanessa). (NOAA 6 visual imagery)